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A NEW CRAYFISH FROM THE TALLAPOOSA RIVER
IN GEORGIA (DECAPODA: ASTACIDAE)

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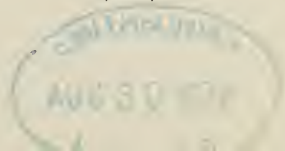
The new species described herein is known from only two localities, both in the upper Tallapoosa River in Haralson County, Georgia, where it occurs syntopically with one of its closest relatives, *Cambarus (Depressicambarus) halli* Hobbs (1968: 269). On the basis of the limited available data, it appears that the new species is restricted to riffle areas of the stream, whereas, *C. (D.) halli* is predominantly a denizen of the stream litter and tangled roots of the shoreline trees and shrubs. The two are remarkably similar in coloration and general mien, but fundamental differences, at least some of which are listed below, do exist between them.

We thank all of those who assisted in collecting the specimens on which the new species is based. We are also grateful to Fenner A. Chace, Jr., and Martha R. Cooper for their criticisms of the manuscript and to Carolyn B. Gast for the illustrations.

***Cambarus (Depressicambarus) englishi* new species**

Figure 1

Diagnosis: Body pigmented, eyes moderately large and well developed. Rostrum usually with marginal spines or tubercles, sometimes tapering without interruption to apex of acumen. Areola 4.2 to 4.9 times longer than wide and comprising 33.2 to 38.0 percent of entire length of carapace



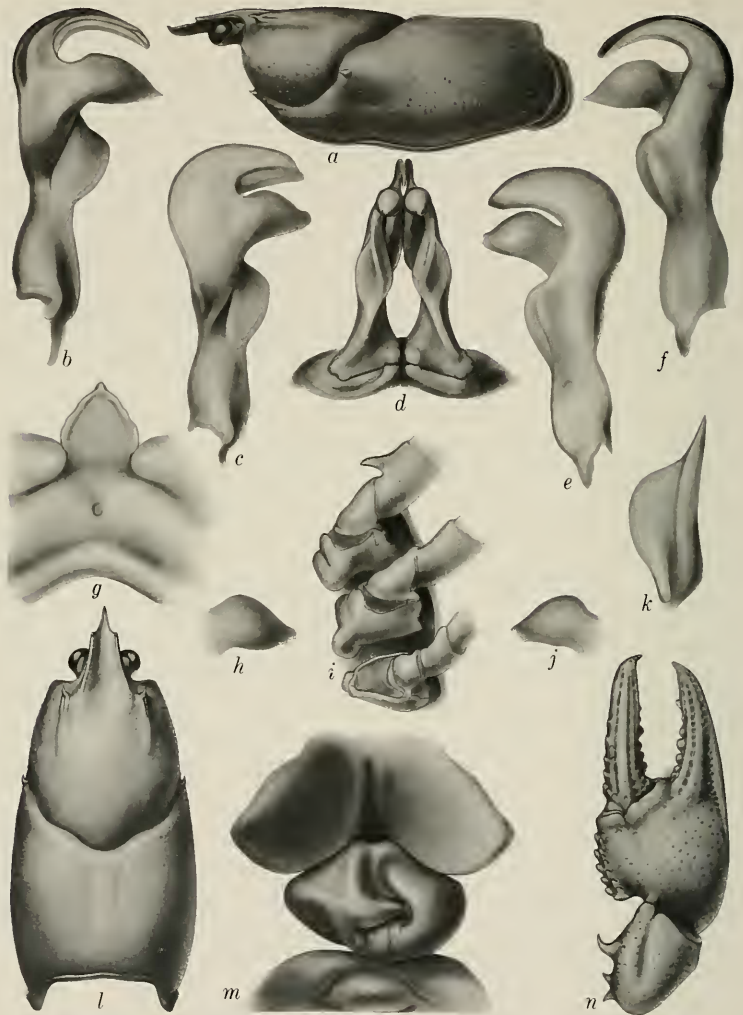


FIG. 1. *Cambarus (Depressicambarus) englishi* new species (pubescence removed from all structures illustrated). *a*, Lateral view of carapace of holotype; *b*, Mesial view of first pleopod of paratypic male, form I; *c*, Mesial view of first pleopod of morphotype; *d*, Caudal view of first pleopods of holotype; *e*, Lateral view of first pleopod of morphotype; *f*, Lateral view of first pleopod of paratypic male, form I; *g*, Epistome of holotype; *h*, Mesial view of left mesial process of holotype; *i*, Basal podomeres of third, fourth, and fifth pereopods of holotype;

(41.3 to 46.7 percent of postorbital length), with four to six punctations across narrowest part. Cervical spines present. Suborbital angle almost obsolete, broadly rounded. Postorbital ridges with cephalic spines or tubercles. Antennal scale approximately 2.8 times longer than broad, lamellar portion evenly rounded, broadest about midlength. Chela with two rows of tubercles along mesial surface of palm, with mesialmost row typically bearing six or seven; lateral margin costate, and both fingers with well-defined longitudinal ridges dorsally. First pleopod (Fig. 1*b, d, f, h, j,*) of first form male with central projection long, narrow, tapering, and recurved at angle of approximately 110 degrees and lacking subterminal notch; mesial process with distinct gap between bulbiform portion and shaft of appendage, either tapering distally to acute tip or truncate with two or three small acute prominences. Annulus ventralis (Fig. 1*m*) distinctly asymmetrical with cephalic membranous portion bearing deep median trough, and with caudal portion slightly movable.

Holotypic Male, Form I: Body subovate, depressed (Fig. 1*a, l*). Abdomen narrower than thorax (12.1 and 14.5 mm); greatest width of carapace greater than depth at caudodorsal margin of cervical groove (14.5 and 11.0 mm). Areola broad, 4 times longer than wide, with four punctations across narrowest part; length of areola 35.4 percent of entire length of carapace (43.0 percent of postorbital length). Rostrum with thickened, elevated, slightly concave borders bearing corneous marginal tubercles at base of long acumen, latter reaching distal extremity of antennular peduncle and terminating in corneous, acute, slightly upturned tip; dorsal surface of rostrum concave with scattered punctations anteriorly, and larger, more crowded ones basally; usual submarginal row of setiferous punctations extending from base almost

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j, Mesial view of right mesial process of holotype; *k*, Antennal scale of holotype; *l*, Dorsal view of carapace of holotype; *m*, Annulus ventralis of allotype; *n*, Dorsal view of distal podomeres of cheliped of holotype.

to tip of acumen. Subrostral ridges moderately well developed and evident in dorsal aspect to base of marginal tubercles of rostrum. Postorbital ridges moderately strong, grooved dorsolaterally, and terminating cephalically in acute spines. Suborbital angle obsolete. Branchiostegal spine moderately large and acute. Cervical spine acute and flanked caudo-dorsally by three tubercles. Carapace punctate dorsally, and granulate laterally; granules somewhat larger in hepatic region and in cephaloventral portion of branchiostegites.

Abdomen slightly shorter than carapace (28.5 and 29.1 mm); pleura moderately long, second through fifth with caudoventral angles. Cephalic section of telson with three spines in each caudolateral corner; caudal section subtriangular. Proximal podomere of uropod with two distal spines, mesial one larger; mesial ramus with poorly developed dorsal keel terminating in distal spine, tip of which almost reaching distal margin of ramus.

Cephalomedian lobe of epistome (Fig. 1g) subtriangular, its base and altitude subequal in length, and with slightly thickened, weakly crenulate, elevated (ventrally) cephalolateral margin; basal portion with prominent cephalomedian fovea. Ventral surface of proximal segment of antennule with prominent spine at base of distal fourth. Antennae reaching third abdominal tergum. Antennal scale (Fig. 1k) about 2.8 times longer than broad, with considerable portion of mesial and lateral margins subparallel; thickened lateral portion terminating in strong acute spine extending anteriorly to or slightly beyond level of tip of rostrum. Third maxillipeds moderately setose, but lateral half of ventral surface of ischium with few setae mesial to sublateral row.

Right chela (Fig. 1n) about twice as long as broad, depressed with inflated palm; mesial margin of palm with row of six prominent tubercles subtended dorsolaterally by row of seven smaller ones; dorsal surface of palm mostly punctate but with few small tubercles mesiodistally; lateral surface rounded proximally and with basal portion of costa extending onto fixed finger; ventral surface punctate and with one prominent tubercle on distal margin at base of

dactyl, another proximolateral to distal tubercle, and row of three extending between latter tubercle and two on fixed finger. Opposable margin of fixed finger with row of six knoblike tubercles along proximal three-fifths of finger, fourth from base largest, and another large tubercle on lower level at base of distal third; single row of minute denticles distal to fifth tubercle from base, interrupted only by sixth tubercle of row; dorsal surface of fixed finger somewhat impressed proximolaterally and bearing prominent submedian ridge and smaller ridge mesially with punctations in impression and flanking ridges and lateral costa of finger; ventral surface of finger with two previously mentioned tubercles proximomesially, otherwise punctate. Opposable margin of dactyl with row of seven knoblike tubercles along proximal three-fourths, fourth from base largest, and row of minute denticles extending distally from fifth, interrupted only by sixth and seventh tubercle of row; dorsal surface of finger with prominent median longitudinal ridge and less prominent, more lateral one; mesial margin with row of six tubercles decreasing in size distally, row flanked on each side by two additional tubercles proximally.

Carpus longer than broad (8.9 and 6.7 mm) with deep, oblique furrow dorsally; dorsal surface otherwise with row of four squamous tubercles mesially, elsewhere punctate; mesial surface with large procurved spine near midlength and smaller one proximally; ventral surface with large submedian distal spine and smaller one on laterodistal articular condyle; remainder of ventral surface and lateral surface punctate. Merus with two prominent spines on dorsal subdistal surface; mesioventral margin with row of eight spines and lateroventral margin with row of two proximal tubercles and two more-distal spines; distal ventrolateral extremity with small corneous spine; podomere otherwise sparsely punctate. Ventral margin of ischium with row of five small tubercles.

Hooks on ischia of third pereopods only (Fig. 1*i*); hooks simple and overreaching basioischial articulation. Coxae of fourth pereopods with rounded caudomesial boss; coxae

TABLE 1. Measurements (mm) of *Cambarus (D.) englishi*.

	Holotype	Allotype	Morphotype
Carapace:			
Height	11.0	13.0	13.1
Width	14.5	18.5	18.0
Length	29.1	36.5	34.3
Postorbital length	23.3	30.2	28.6
Areola:			
Width	2.5	2.9	2.9
Length	10.0	13.0	12.7
Rostrum:			
Width	4.2	5.0	5.1
Length	6.9	7.6	7.2
Left Chela:			
Length of mesial margin of palm	6.9	8.6	7.0
Width of palm	10.3	13.6	11.0
Length of lateral margin of propodus	21.0	27.1	23.5
Length of dactyl	12.8	17.0	15.6

of fifth pereiopods with boss almost obsolete. For measurements, see Table 1.

First pleopods (Fig. 1*b, d, f, h, j*) reaching coxae of third pereiopods when abdomen flexed. As described in diagnosis except mesial process less attenuate distally and bearing two or three small apical projections on left and right pleopods, respectively.

Allotypic Female: Differing from holotype in following respects: acumen reaching midlength of ultimate podomere of antennular peduncle, much exceeded by distal spine on antennal scale; areola more sparsely punctate; cephalic section of telson with two spines in each caudolateral corner; ventral surface of palm of chela with two spiniform tubercles proximal to marginal tubercle at base of dactyl; opposable margin of fixed finger of chela with row of seven knoblike tubercles along proximal two-thirds, fifth from base largest; merus of cheliped with additional spiniform tubercle on ventral surface situated ventromesial to large spine on mesial surface. See Table 1 for measurements.

Annulus ventralis (Fig. 1*m*) moderately deeply embedded

in sternum, only slightly movable and with cephalic half pliable, almost membranous. Outline somewhat asymmetrical, produced much farther caudally on left than on right; cephalic half with deep median longitudinal furrow inclined caudally to left; right transverse ridge near midlength forming tongue disappearing beneath inflated dextrocaudal wall; sinus originating in longitudinal furrow along cephalic margin of tongue and disappearing under left wall, then reappearing on caudo-sinistral margin of tongue, following latter caudodextrally across median line, there making sharp turn caudosinistrally and finally cutting caudal margin of annulus slightly dextral to median line. Median sclerite immediately caudal to annulus elliptical. First pleopods uniramous and extending to midlength of annulus when abdomen flexed.

Morphotypic Male, Form II: Differing from holotype in following respects: rostrum with marginal tubercles reduced to very small corneous knobs, apex of acumen not quite reaching midlength of distal podomere of antennular peduncle; antenna reaching caudally to sixth abdominal tergum; branchiostegal spines reduced to small tubercles; cephalic section of telson with only two spines in each caudolateral corner; palm of chela with dorsomesial row of only five tubercles; opposable margin of fixed finger of chela with row of five tubercles and tubercle beyond row almost in line with proximal row; proximal five tubercles in row on opposable margin of dactyl subequal in size; ventromesial row of spines on merus of cheliped consisting of only six on right chela; hooks on ischia of third pereopods reduced in size and length, and boss on coxa of fourth pereopod slightly smaller and less conspicuous. See Table 1 for measurements.

First pleopod (Fig. 1c, e) with both terminal elements much heavier and approximating one another more closely than in holotype; apex of mesial process subtruncate.

Color Notes: Cephalic portion of carapace brownish olive dorsally with cream-tan markings over origins of gastric muscles; hepatic area greenish blue, fading ventrally to bluish cream; rostral margins, postorbital and suborbital ridges orange; tubercles in hepatic area and cephalic margin ventral

to orbit cream. Thoracic area with areola straw-brown, dorsal portions of branchiostegites orange tan fading ventrally to bluish cream and studded with small pale tubercles; caudal ridge on carapace pinkish cream with narrow, almost black band immediately cephalic to ridge; band, except on dorso-lateral area of branchiostegite, fading rapidly anteriorly, there more gradually. Dorsal surface of first abdominal segment mostly pinkish cream with one broad or two narrow blackish transverse bands cephalically; remaining abdominal terga and pleura blackish with narrow pinkish cream transverse band along caudal margin of each, band continuing on ventral margin of pleura and expanding on cephalic side of latter. Telson and uropods blackish dorsally and pale bluish green bordered in tan ventrally. Chela olive green dorsally with orange to cream-orange tubercles, lateral costa, and distal portions of fingers; latter with yellowish orange (corneous) tips. Carpus brownish olive dorsally with orange-cream tubercles and spines; dorsodistal part of merus dark olive with orange-cream spines. All podomeres fading ventrally to pinkish or bluish cream. Remaining pereopods with podomeres distal to ischium pale olive dorsally, carpus darkest with other podomeres fading gradually toward proximal and distal ends of appendages; all podomeres fading ventrally.

Size: The largest specimen available is a female having a carapace length of 39.2 mm. The largest and smallest first form males have corresponding lengths of 36.4 and 29.1 mm.

Type-locality: Tallapoosa River, in riffle area immediately downstream from City of Tallapoosa water intake, 1 mile north of Tallapoosa, Haralson County, Georgia, a few hundred yards east of bridge on State Route 100. There the River is some 40 feet wide, and in the riffle area only 1 or 2 feet in depth. The bed of the riffle consists of moderately large stones, partially embedded in sand, that support a luxuriant growth of *Podostemum ceratophyllum*. At low-water stages, the water is almost clear, but, frequently, following rains it becomes reddish orange in color, due to the heavy load of clay and silt, and attains a depth of more than 4 feet. Four crayfishes frequent this segment of the stream, with *C. (D.)*

englishi dominating the riffle and *C. (D.) halli* the litter and root mats of plants growing along the banks. Far less abundant are *Procambarus (Pennides) spiculifer* (LeConte, 1856: 401) and *Cambarus (D.) latimanus* (LeConte, 1856: 402).

Types: The holotypic male, form I, allotypic female, and morphotypic male, form II (Nos. 131700, 131701, and 132519, respectively) are deposited, together with the paratypes (8♂I, 6♀, 9 juv. ♂, and 10 juv. ♀), in the National Museum of Natural History, Smithsonian Institution.

Range and Specimens Examined: *Cambarus (D.) englishi* is known from only two localities, on the Tallapoosa River in Haralson County, Georgia. One juvenile male and two juvenile females, not included in the type-series, were taken from the River, 2.5 miles west of Tallapoosa by Max W. Walker and E. T. Hall, Jr. on 3 September 1969. The remaining specimens constituting the type-series were collected at the type-locality by T. A. English, Jr., R. F. Holbrook, E. T. Hall, Jr., and H. H. Hobbs, Jr., (3 September 1969; 13 October 1969; and 23 September 1971).

Variations: Among the more conspicuous variations occurring in *C. (D.) englishi* is the presence or absence of marginal tubercles or spines on the rostrum. All of the young individuals, as well as some of the largest, have well-developed spines, but in several adults there is not a trace of a tubercle and scarcely any interruption of the margins between the basal portion of the rostrum and the acumen. The areola varies from 4.2 to 4.9 times longer than wide and comprises from 33.2 to 38.0 (average 35.4) percent of the total length of the carapace; only two specimens, however, have areolae constituting less than 34 percent and two others as much as 37 percent.

The row of tubercles on the mesial surface of the palm of the chela varies from five to eight, with seven the usual number; only one individual has eight on one chela and another has five on one member of the pair. The tubercle on the ventral surface of the palm, at the base of the dactyl, may be simple, essentially bifid, or absent, and there are one to

three proximal to it. The number of tubercles along the fixed finger and dactyl ranges from five to eight and seven to eight, respectively. The two spines on the mesial surface of the carpus are present in all except one specimen in which the proximal one is lacking, and, in one individual, there are two additional small tubercles. The ventral surface of the carpus always has the two tubercles as described for the holotype, and an occasional third tubercle is present as in the allotype. The dorsal surface of the merus of all of the specimens except one, in which there are three, bears two spiniform tubercles; the ventromesial row consists of seven to nine tubercles and the ventrolateral of two to seven.

The mesial process of the first pleopod of the first form male may be somewhat more inflated than those illustrated in Figure 1*b, d, f, h, and j*, but the distal extremities do not exceed the limits indicated in the figure. The cephalic portion of the annulus ventralis is consistently membranous, but in all except three of the females, the tongue is directed dextrally. See Table 1 for measurements.

Relationships: Among the closest relatives of *Cambarus (Depressicambarus) englishi* is the syntopic *C. (D.) halli*. The two were collected from the same segment of the Talapoosa River at the type-locality, and their coloration and general conformation are so markedly similar that when first examined, they were believed to be conspecific. Other close relatives include *C. (D.) jordani* Faxon (1884: 119) from the Coosa River system and *C. (D.) obstipus* Hall (1959: 221) from the Black Warrior drainage. It differs from all three in the more distally situated tumescence of the mesial process of the first pleopod of the first form male. In addition, it may be distinguished from *C. (D.) halli* by the more gently curved and entire (lacking a subapical notch) central projection of the first pleopod, usually in possessing a narrower, longer, and less densely punctate areola, and distinctly thickened rostral margins that are at least slightly concave. It differs from *C. (D.) obstipus* in having a much longer, more strongly recurved central projection of the first pleopod and a broader, usually shorter areola. Characters that serve to

separate *C. (D.) englishi* from *C. (D.) jordani* include the longer, slenderer, and less strongly recurved central projection of the first pleopod, and the more spiniform conditions of most of the tubercles on the carapace and chelipeds.

Life History Notes: First form males have been collected in September and October, and inasmuch as those that were taken on 23 September 1971 were encrusted, it may be concluded that they had not molted for a number of months, which suggests, in turn, that the breeding season extends through the summer months. Seemingly paradoxically, among the specimens collected in September and October 1969, all of the adult males had recently molted to first form! Only one second form male, the morphotype, has been obtained, and that specimen, taken on 23 September 1971, was also encrusted.

Etymology: This crayfish is named in honor of Teddy A. English, Jr., our mutual friend and frequent companion on collecting trips in Georgia.

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